We Claim:

1. A high-voltage power supply, comprising:

a power scaling section receiving an input voltage signal and converting said input voltage signal to a controllable DC voltage;

a push-pull converter for converting said controllable DC voltage to a high-frequency wave; and

a voltage multiplier receiving said high-frequency wave generated by said push-pull converter and performing successive voltage doubling operations to generate a high-voltage DC output.

2. The high-voltage power supply of claim 1, further comprising:

a control module for controlling said power scaling section and said push-pull converter.

3. The high-voltage power supply according to claim 2, wherein

said power scaling section includes a switching element, a duty cycle of which controls the amplitude of said controllable DC voltage, and

said control module outputs a gate switching signal to said switching element of said power scaling section as a function of a desired output voltage of the high-voltage power supply.

4. The high-voltage power supply according to claim 3, wherein said control module receives a feedback signal based on the output of said power scaling section to adjust said gate switching signal.

5. The high-voltage power supply according to claim 2, wherein

said push-pull converter includes a plurality of switching elements and a transformer for generating said high-frequency wave, and

said control module outputs gate switching signals to the switching elements of said push-pull converter to control the frequency of said high-frequency wave.

6. The high-voltage power supply according to claim 5, wherein said switching elements are MOSFET switching elements.

7. The high-voltage power supply according to claim 1, wherein said high-frequency wave is a square wave.

8. The high-voltage power supply according to claim 1, wherein the frequency of said high-frequency wave is approximately 100 kHz.

9. The high-voltage power supply according to claim 1, wherein said controllable DC voltage is in the range of approximately 0-to28 kV.

10. The high-voltage power supply according to claim 1, wherein said power supply generates an output voltage of in the range of approximately 0-to-30 kV, DC.

11. The high-voltage power supply according to claim 1, wherein said high-frequency wave has an amplitude of approximately 0-to-1 kV.

12. The high-voltage power supply according to claim 2, wherein said control module is an analog controller.

13. The high-voltage power supply according to claim 1, wherein said voltage multiplier includes a plurality of voltage doubler stages on a circuit board and said high-voltage power supply further comprises an insulation system associated with said circuit board.

14. The high-voltage power supply according to claim 13, wherein said insulation system is a multi-layer system of n layers of insulation and m conducting strips positioned between successive insulating layers.

15. The high-voltage power supply according to claim 13, wherein said insulation system is a field-controlled multi-layer insulation system.

16. The high-voltage power supply according to claim 13, wherein said plurality of voltage doubler stages are divided among multiple circuit boards, separate from said power scaling section and said push-pull converter.

17. The high-voltage power supply according to claim 13, wherein said plurality of voltage doubler stages include capacitors arranged in a zig-zag pattern.

18. A method for providing high-voltage power, comprising:

receiving an input voltage signal and scaling said input voltage signal to a controllable DC voltage;

converting said controllable DC voltage to a high-frequency wave; and

performing voltage multiplication on said high-frequency wave generated by said converting step to generate a high-voltage DC output.

19. The method of claim 18, further comprising:

controlling said scaling and converting steps in accordance with a command signal.

20. The method according to claim 19, wherein

said scaling step is performed by a power scaling section having a switching element, a duty cycle of which controls the amplitude of said controllable DC voltage, and

said step of controlling outputs a gate switching signal to the switching element of the power scaling section as a function of a desired output voltage.

21. The method claim 20, wherein said controlling step generates said gate switching signal as a function of a feedback signal indicating the output of the power scaling section.

22. The method according to claim 19, wherein

said converting step is performed by push-pull converter that includes a plurality of switching elements and a transformer for generating said high-frequency wave, and

said controlling step outputs a gate switching signal to the switching elements of said push-pull converter to control the frequency of said high-frequency wave.

23. The method according to claim 22, wherein said switching elements are MOSFET switching elements.

24. The method according to claim 18, wherein said high-frequency wave is a square wave.

25. The method according to claim 18, wherein the frequency of said high-frequency wave is approximately 100 kHz.

26. The method according to claim 18, wherein said controllable DC voltage is in the range of approximately 0-to28 V.

27. The method according to claim 18, wherein said method generates an output voltage of approximately 0-to-30 kV, DC.

28. The method according to claim 18, wherein said high-frequency wave has an amplitude of 0-to-1 kV.